

Mapping and Orienteering



Grade: 5th

Time: 4-5 days

Lesson Description: Students will learn about mapping and orienteering through hands-on and interactive activities.



Photo: Archaeologists mapping a village site, Kodiak Island, 2010.

Kit Includes:

- Graph Paper
- North, South, East, and West signs
- Compasses

Materials Needed:

- Pencils
- Clipboards
- Calculator
- Rulers
- Measuring tapes
- Map of school playground

Vocabulary	Alutiiq Vocabulary	Art Elements	Art Principles	Content Connections
Map Orienteering Cardinal Directions Scale Symbols Legend Pacing Landmark Checkpoint Compass Navigation Latitude Longitude Compass rose	Waasaaq—North Ungalaq—East Llaaniq—West Waakeq—South Kiakeq—Northeast Saniikiaq—Southeast Nakirsariiq—Southwest Nunameq—Northwest Nunam Kalikaa—Map It is important to note that some of the Alutiiq terms may have different meanings depending on the Alutiiq speaker.	<input checked="" type="checkbox"/> Line <input checked="" type="checkbox"/> Shape <input checked="" type="checkbox"/> Color <input checked="" type="checkbox"/> Value <input checked="" type="checkbox"/> Texture <input checked="" type="checkbox"/> Space/ Perspective	<input checked="" type="checkbox"/> Pattern <input checked="" type="checkbox"/> Rhythm/ Movement <input checked="" type="checkbox"/> Proportion/ Scale <input checked="" type="checkbox"/> Balance <input checked="" type="checkbox"/> Unity <input checked="" type="checkbox"/> Emphasis	Reading - interpreting informational text about maps and orienteering. Math- measuring distances, understanding scale, and applying math concepts to create accurate maps. Social Studies- introduces maps, cardinal directions, symbols, and scale.

Objectives and Assessment Criteria:

Students will learn...

- The concepts of maps, emphasizing their importance and real-world applications.
- About map symbols, legends, and how to interpret them to gain information.

- To apply measurement skills to create a sketch map of the classroom, focusing on accuracy and representation.
 - To apply mapping skills to a real-world scenario by mapping the school playground, including key features and details.
-

Fifth Grade Standards for Mathematical Content:

5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers (e.g. by using visual fraction models or equations to represent the problem).

5.G.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpreting coordinate values of points in the context of the situation.

Fifth Grade Standards for Mathematical Practice:

- Draw diagrams of important features and relationships, graph data, and search for regularity or trends.
- Represent a situation symbolically.
- Identify important quantities in a practical situation and model the situations using such tools as manipulatives, diagrams, two-way tables, graphs, or pictures.
- Select the available tools (such as pencil and paper, manipulatives, rules, calculators, a spreadsheet, and available technology) when solving a mathematical problem.

Geography Standards

A2) Make maps, globes, and graphs.

A4) Use graphic tools and technologies to depict and interpret the world's human and physical systems.

A5) Evaluate the importance of the locations of human and physical features in interpreting geographic patterns.

Cultural Relevance:

The Alutiiq word for map, *nunam kalikaa*, means “the land’s paper.” Although maps and marine charts are important to modern hunters and fishermen, they are recent navigational tools. For thousands of years, Alutiiq people stored information about the landscape in place names and stories. Eighteenth-century Russian fur traders made the first maps of Alaska. Sailing eastward from Siberian ports, they charted portions of the Bering Sea, Aleutian Islands, and Gulf of Alaska coasts, weaving together their observations and geographic details gleaned from Alaska Natives. Early hand-drawn maps show details for portions of the coast, with gaps for regions yet to be investigated. By the early 1800s, however, extensive exploration allowed Russian cartographers to produce a relatively accurate map of the North American coastline between the areas now known as western Alaska and southern British Columbia. Russian traders first learned of the Kodiak Archipelago in about 1760. Residents of the eastern Aleutian Islands, including a Kodiak man taken captive by the Unangan, reported a distant island off the southern coast of the Alaska Peninsula that was rich in foxes and sea lions. Based on their information, Petr Shiskin, a crewmember aboard the *Sv. Iulian*, created the first known map showing Kodiak.

Create:**Prep:**

- Look ahead to day 2. Before you start the lesson, determine the cardinal directions in your classroom.
- If you decide to do the additional activity (Orienteering Challenge), start creating it now. Please read the entire lesson to plan before starting with your class.

Preparation for the Orienteering Challenge:

- Take a map of the school grounds and mark checkpoints on it. Include a mix of easy and more challenging checkpoints.
- Number each checkpoint and provide an approximate distance between checkpoints.
- Prepare clue cards for each checkpoint. These cards can provide hints or riddles that guide students to the next checkpoint. For example, "Find the tree that stands alone near the soccer field."

Day 1: Slide #2–

- **Slide #3**–Start today's lesson by asking students to turn and talk to their partner about how maps are used in the world today.
- **Slide #4**–Possible answers are listed below. Mention that the map on the slide is a world population density map.
 - Navigation.
 - Spatial understanding – the relationships between different locations and features.
 - Planning and decision-making from construction projects to emergency evacuation routes.
 - To teach geography and history.
 - Assist travelers in exploring new locations.
 - Data visualization to help display data spatially such as population distribution and weather patterns.
 - Provide insights on historical boundaries and trade routes.
 - Help scientists and researchers study climate patterns, ecosystems, and geological formations.
- **Slide #5**–Mention that the map on the slide is a time zone map of the United States.
 - In summary, maps help us understand the world around us, make informed decisions, and communicate effectively about locations and spatial relationships.
 - They play a significant role in aspects of our lives, from daily navigation to complex scientific research.
 - In Alaska specifically, maps are essential for navigating the vast and varied landscape including forests, mountains, and bodies of water.
- **Slide #6**–Brainstorm as a class the different types of maps. Write out the answers that students come up with on the board. Show them the next two slides with a list of some of the most common types of maps. Mention that the map on the slide is a topography map of Alaska.
- **Slide #7**–Mention that the map on the slide is a Kodiak Island bear hunt area map.

- **Political Map:** Shows boundaries of countries, states, and cities, often with political features like capitals and major cities labeled. These maps focus on the administrative divisions of regions.
- **Physical Map:** Depicts natural features of the Earth's surface, such as mountains, rivers, oceans, and deserts. Physical maps use colors and shading to highlight elevation changes and landforms.
- **Topographic Map:** A detailed physical map that includes contour lines to represent changes in elevation. Topographic maps are often used by hikers and surveyors to navigate through terrain.
- **Thematic Map:** Focuses on a specific theme or topic, such as population density, climate, economic activities, or transportation networks. Thematic maps use various symbols and colors to represent data.
- **Climate Map:** Shows climate zones and patterns across different regions. These maps use colors to represent different climatic conditions like temperature and precipitation.
- **Population Density Map:** Illustrates the concentration of people in different areas, usually using colors to indicate levels of population density.
- **Road Map:** Designed for navigation, road maps show highways, roads, and streets. They often include information about distances between locations and points of interest.
- **Slide #8**—Mention that this slide is a school zone map for the town of Kodiak.
 - **Satellite Image Map:** Utilizes satellite imagery to display the Earth's surface from space. These maps provide a realistic view of landscapes and features.
 - **Historical Map:** Depicts a specific historical period, showing political boundaries, territories, and cities as they existed in the past.
 - **Cadastral Map:** Focuses on land ownership and property boundaries. These maps are often used for property assessment and land management.
 - **Aerial Map:** Similar to satellite image maps, aerial maps use photographs taken from aircrafts to show detailed views of landscapes and urban areas.
 - **Nautical Chart:** Created for maritime navigation, nautical charts display bodies of water, coastlines, depths, and underwater hazards.
 - **Geological Map:** Illustrates the distribution of rock formations, minerals, and geological features in a specific area.
 - **Zoning Map:** Used by urban planners and local governments, zoning maps show land-use regulations and zones within a city or municipality.
 - **Population Migration Map:** Depicts the movement of people from one place to another over time, helping to understand migration patterns.
- **Slide #9**—More maps: community, neighborhood, park, and classroom maps.
- **Slide #10**—Another example of a map. Topography map of the U.S.Coast Guard base and airport in Kodiak, Alaska.
- **Slide #11**—Ask students to turn and talk to a classmate about the importance of symbols and legends on maps.
- **Slide #12— Symbols & Legends**
 - Symbols allow maps to show a lot of information about features like roads, buildings, and rivers in a visually concise manner.

- They save space.
- Allow for quick interpretation.
- Some are universally understood.
- Legends are keys that explain the meanings of the symbols used on a map.
- **Slide #13**–Have students pair up and write down as many symbols they can think of that are commonly used on maps in 3 minutes (this can be adjusted to fit your needs). You can allow students to use ipads/computers to look up symbols for assistance. Have the winning group read their list out loud. Common symbols are listed below:
 - House
 - Tree
 - River
 - Road
 - Bridge
 - Railroad
 - Airport
 - School
 - Hospital
 - Park
 - Church
 - Police station
 - Gas station
 - Mountain
 - Lake
 - Restroom
 - Campsite
 - Parking
 - Picnic area
- **Slide #14**–Exit Ticket
 - List three things you learned about maps today.
 - What is one thing that you are curious about with regards to maps after today?

Day 2: Slide #15–Before this lesson, figure out the cardinal directions in your classroom.

- **Slide #16**–Start the lesson with a map legend activity.
 - Tell the class that their job is to become map legend detectives and figure out the meaning of the symbols on their maps.
 - Give them the map of the Buskin Area Trails (Kodiak Refuge Reference Guide) without the symbol names and have the students identify the symbols in the legend.
- **Slide #17**–Check your answers
- If your class needs a review of the cardinal directions and coordinates use **Slide #18**. If not, skip this slide.
 - **North:** The top of most maps is oriented toward the north direction. North is represented by the letter “N” or an upward-pointing arrow.
 - **South:** The bottom of the map is oriented toward the south direction. South is represented by the letter “S” or a downward-pointing arrow.
 - **East:** The right side of the map is oriented toward the east direction. East is represented by the letter “E” or a right-pointing arrow.
 - **West:** The left side of the map is oriented toward the west direction. West is represented by the letter “W” or a left-pointing arrow.
 - **Latitude:** Explain that lines of latitude run east-west around the earth and measure distances north and south of the Equator.
 - **Longitude:** Explain that lines of longitude run north-south from pole to pole and measure distances east and west of the Prime Meridian.
 - *They help us understand the relative positions of different features on a map. They are essential for reading maps accurately and navigating to specific locations.*

- **Slide #19**–Different ways to find directions. Before modern compasses, people used other methods to find their way, and many people still do today when not using a GPS or compass. Other ways to find directions:
 - The location of the sun.
 - The location of the stars.
 - The location of landmarks.
 - The direction of the wind.
 - The location of a shadow using a stick.
- Have students point to North—*Waasaaq* (**Slide #20**), West—*Llaaniq* (**Slide #21**), South — *Waakeq* (**Slide #22**), and East—*Ungalaaq* (**Slide #23**) in your classroom. **It is important to note that some of the Alutiiq terms may have different meanings depending on the Alutiiq speaker.** Put up signs after this activity has been completed.
- **Slide #24**–Explain that maps have scales to help us understand the relationship between map distances and real-world distances, allowing us to interpret the size and distance of features accurately. There are three types of scales.
 - **Ratio scale:** This is expressed as a ratio. For example, in a 1:10,000 scale, 1 inch on the map represents 10,000 inches on the ground.
 - **Graphic scale:** A line or a bar marked with different lengths represent specific distances. It is typically labeled with both map units (inches or centimeters) and real-world units (miles or kilometers).
 - **Verbal Scale:** Uses words to describe the relationship between map distances and ground distances. For example, it might say “1 inch represents 1 mile.”
- **Slide #25**–How do you find an archaeological site?
 - Look at old maps.
 - Reading historical accounts and stories.
 - Talk to Elders and community members that live on the landscape.
 - Look at aerial photos and LiDAR imagery to find collapsed structures or other human-made features.
 - Survey–look for artifacts, collapsed structures, or fire cracked rock.
 - Dig small test pits to look for artifacts or other cultural materials.
 - **Slide #26**–How Do Archaeologists Know Where to Dig? History Nebraska Archeology [YouTube: 4:53]
 - <https://www.youtube.com/watch?v=O2zQSnrj7ik>
 - It is important to know where you are.
 - What to do when you find a site.
- **Slide #27**–Where are you on a world map? Have students point or circle where.
- **Slide #28**–Where are you on the map of Alaska? Have students point or circle where.
- **Slide #29**–Where are you on a map of Kodiak? Have students point or circle where.
- **Slide #30**–We have learned all about mapping. Turn and talk to your partner about why archaeologists need mappings skills?
- **Slide #31**–Maps provide a visual framework that helps archaeologists understand the complexities of past human activities, environments, and cultural landscapes. They are the essential tools for accurately recording, analyzing, and interpreting archaeological sites and their significance.

- **Site Documentation:** Maps allow archaeologists to document the layout of excavation sites, artifact distributions, and the positions of features. This documentation is essential for accurately recording the context of artifacts and structures within a site.
- **Contextual Understanding:** Maps help archaeologists understand the spatial relationships between different artifacts, features, and structures. This spatial context provides insights into how people lived, worked, and interacted within a specific area.
- **Planning and Strategy:** Archaeologists use maps to plan excavation strategies. They can determine where to place excavation units based on the distribution of artifacts and features.
- **Recording Progress:** Maps help archaeologists track the progress of their excavation by showing which areas have been excavated and which remain untouched.
- **Comparative Analysis:** Archaeologists often compare maps from different excavation seasons or sites to analyze changes in the landscape or settlement patterns over time.
- **Slide #32–**
 - **Spatial Patterns:** Maps reveal spatial patterns, such as concentrations of artifacts or evidence of human activity, which may provide insights into cultural practices like trade routes and village organization.
 - **Communication:** Maps facilitate communication among archaeologists and other experts. They provide a visual representation of findings, making it easier to convey information to other people.
 - **Research and Interpretation:** By analyzing maps, archaeologists can generate ideas about how people used and interacted with their environment.
 - **Preservation:** Accurate mapping helps archaeologists plan for the preservation of sites, ensuring that future research can continue to uncover new information.
 - **Publication:** Archaeologists often publish maps as part of their research reports, helping others to understand their finds.
- **Slide #33–**Sketch maps: Quick drawings that record the basic characteristics of a site. Archaeologists often make sketch maps to summarize their finds and provide a picture for their notes. Maps help archaeologists understand and record the remains of buildings like this sod house. The map on the right shows a sod house built about 1840. Archaeologists uncovered the house and made this map. Then, an artist used the map to draw a picture of what the house might have looked like shown on the left.
- **Slide #34–**Exit Ticket
 - List three reasons why archaeologists need mapping skills.
 - What is one thing that you are curious about archaeology after today?

Day 3: Slide #35–

- **Slide #36–**Introduce the idea of pacing/counting steps to measure distances. Demonstrate how to measure and pace the distance between two points (that you pick) in your classroom. For example, from the teacher's desk to the drinking fountain or from a particular student's desk to the garbage can.

- **Slide #37**–Divide the class into groups and have them measure (using a measuring tape) and pace the distances between three different sets of objects in the classroom. Have them record their answers on the *Pacing and Measuring Objects in the Classroom Worksheet*.
 1. Pick two objects in the classroom to measure the distances between. If it is a larger object, be more specific. For example, the bottom right corner of the dry erase board. If someone tried to replicate what you are doing, would they be able to do so?
 2. Start by having one student hold the tape measure/measuring tape at the first object while another student carefully stretches it to the second object.
 3. Record the distance in centimeters.
 4. Then pace or walk the line where the tape measure/measuring tape was and record how many steps it took to get from the first object to the second one.
 5. Repeat this process two more times.

You can choose to do this activity to scale or not. See the options below

Because the students will be making a scaled map of the playground on day 4, it is advisable that they try to do the classroom map to scale. That said, if your class is not ready to create a scaled map, do the basic sketching map activity below. There is an example of a classroom map on Slide #40 if students need assistance.

- **Option 1: Basic sketching map activity instructions on Slide #38**
 - Explain to students that they will now be creating a map of the classroom with a partner.
 - Emphasize that the sketch maps do not need to be perfect replicas but should convey essential features.
 - Guide the students through the process.
 - Sketch the overall shape of the classroom on your paper drawing walls, doors, and windows as accurately as possible. Using the directions up on the walls, orient your map so that the northern wall is at the top of the paper.
 - Add desks, chairs, and any other major objects in their approximate positions. Use symbols for simple/smaller objects like chairs (small squares) and windows (small rectangles) and provide a legend so that a map reader will know what the symbols represent.
 - Label the key features on your map. For example, teacher’s desk, door, drinking fountain.
 - Have partners share their sketch maps with the class.
 - Lead a class discussion about the challenges that students encountered and what strategies they used while creating their sketch maps.
- **Option 2: Creating a to-scale sketch map of the classroom on Slide #39**
 - Explain that students will be taking their mapping skills a step further by creating a map of the classroom that is to scale. This means that the map will accurately represent the room’s proportions and distances.
 - Discuss as a class different scale options (i.e. 1 inch= 1 foot, 1 cm=1 meter) and their pros and cons. Guide students to choose a scale that works well for the size of the classroom and the paper they are using. Archaeologists use the metric system so you could also have students only use that system.

- Divide the class into partners or small groups. Provide each with a measuring tape and have them follow these directions.
 - Pick a starting point (one of the corners of the north wall). Measure the dimensions of the classroom, including the length, width, and key features like doors and windows.
 - Use the scale to calculate how long each wall and feature will be on your map. For example, if the classroom is 30 feet long and you are using a 1 inch=1 foot scale, the length of the map will be 30 inches.
 - On the graph paper, use your ruler to draw the northern wall to scale on the top. Continue to draw the remaining walls/layout of the classroom according to their scale measurements.
 - Add desks, chairs, windows, and doors to the map in the correct positions, as if you were looking at the classroom from a bird's eye view.
 - Create a legend with symbols for desks, chairs, windows, doors, etc. and write down what each symbol represents.
 - Label key features on the map such as the teacher's desk, drinking fountain, windows, doors, etc.
- Have groups/partners share their maps with the class.
- **Slide #40**—Lead a class discussion about the challenges students faced, what they learned about scale and legends, and the importance of accuracy in mapping.
- Exit Ticket is the map of the classroom the students created.

Day 4: Slide #41—

- Ask students to share what they have learned about mapping so far and why accurate maps are important.
- Explain that today they will be using their mapping skills to create a detailed and accurate map of the school playground (if your school has more than one, pick whichever one would be most appropriate for this activity)
- Emphasize the importance of paying attention to detail and accuracy in representing the playground's features.
- Divide the class into small groups and assign each group a specific area of the playground to map (you could also have each group map the entire playground). This could include play structures, sports fields, benches, pathways, etc.
- **Slide #42**—Provide each group with graph paper, rulers, pencils, calculators, clipboards, and instructions. Review the instructions before going outside.
 - Pace out the length and width of your assigned area and then transfer those measurements to the graph paper, drawing the boundaries of the area to scale.
 - Accurately represent the playground's features, including play structures, benches, trees, and pathways using symbols for these features and labeling each one.
 - Indicate the orientation of your assigned area using cardinal directions to provide a sense of direction on the map.
 - Create a legend for your map.

- Return to class and combine your maps with the rest of the class to create a map of the entire playground.
- Once the groups have completed their maps, return to the classroom and have each group present their map to the class, explaining their legend, symbols, and key features. Then combine the maps together to create an entire playground map.
- **Slide #43**—Lead a class discussion about the mapping experience. Ask students about the challenges they faced, the importance of accuracy, and how their maps contribute to understanding the playground better.

Day 5: Slide #44—Coordinate with the Alutiiq Museum to schedule a Mobile Museum visit.

- **Slide #45**—What to do if you find a site?
 - Where is the site located? Put a dot on a map. Mark the GPS coordinates. This will help people find it again.
 - What type of site is it? What do you see? Include as much detail as possible.
 - Make a sketch map of the site. Note things like water, bank edges, trees, hills, trails, and anything else you see. This will help identify different things at the location.
 - Be sure to never dig in a site. Take photographs and notes. Report your finds to the landowner or an archaeologist at the Alutiiq Museum.
 - Teach your family and friends to respect archaeological sites. Most people do not know that it is destructive, disrespectful, and illegal to alter sites.
 - Report site vandalism to the Alaska Office of History and Archaeology.
- **Slide #46**—Additional Activities:
- An Archaeological Survey of Sitkinak Island, Alaska by Patrick Saltonstall, Curator of Archaeology: <https://vimeo.com/695860623>
- This Sod House. [YouTube Frontier Scientist 11:19] https://www.youtube.com/watch?v=6oM9M8B_s8k

Additional Activity:

Preparation for the Orienteering Challenge:

- Take a map of the school grounds and mark checkpoints on it. Include a mix of easy and more challenging checkpoints. Number each checkpoint and provide an approximate distance between checkpoints. Prepare clue cards for each checkpoint. These cards can provide hints or riddles that guide students to the next checkpoint. For example, “Find the tree that stands alone near the soccer field.”

Orienteering Challenge Day

- Divide the class into small groups. Provide each group with a map, a compass, and a set of clue cards. Explain that they must navigate as a group (everyone has to stick together) from checkpoint to checkpoint using the map and clues.
- Emphasize the importance of teamwork, map reading, and accurate compass use. Have each group start at a different checkpoint to prevent crowding.
- Give the first clue card to each group. When they find the corresponding checkpoint, they will find the next clue card there. As the groups to navigate. Encourage them to refer to the map and use their orienteering skills to locate checkpoints.
- Remind them to pay attention to compass directions, distances, and landmarks. The challenge concludes when groups find all the checkpoints and return to the starting

point or designated finish line. If you are using a timer, record the time each group takes to complete the challenge.

- After completing the challenge, have each group discuss the following questions.
 - What strategies did you use to navigate?
 - Were there any challenges you faced?
 - How did teamwork help you?
- Have a class discussion about the orienteering challenge.
 - Discuss the importance of map reading, compass use, and problem-solving.
 - Highlight the practical applications of orienteering in real-life situations.
- If desired, provide a small reward or prize to the group that completed the challenge in the fastest time or demonstrated exceptional teamwork.

Close and Assessment:

- Students can correctly identify and understand map symbols and their meanings.
- Student maps are accurate in representing key features, proportions, and measurements.
- Students use of symbols and legends convey the information in both classroom and playground maps.
- Observe student participation and engagement in the orienteering challenge.
 - Have students reflect on the experience. Ask them to describe the strategies they used, the challenges they faced, and what they learned.

Modification:

- See the lesson activities for full descriptions of modifications. Students can create a sketch map or a scaled map. This could be different for individual students, groups, or the entire class.

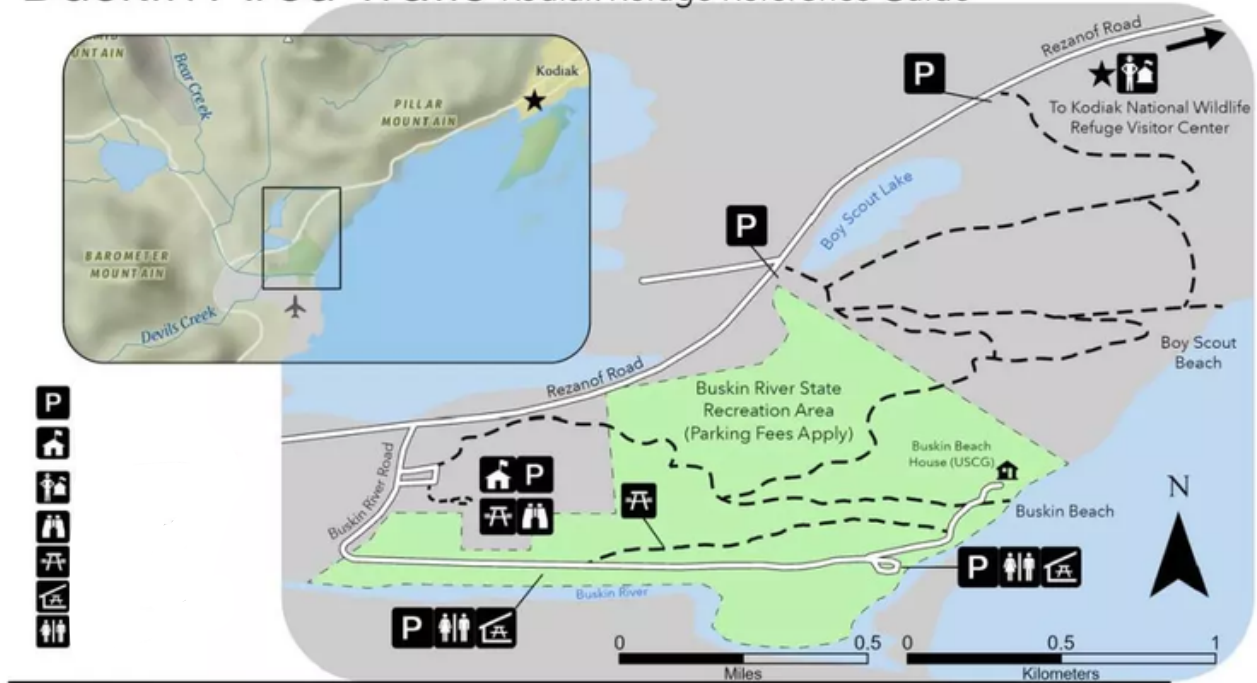
Additional Resources:

- National Geographic Society: Map Skills for Elementary Students:
<https://www.nationalgeographic.org/education/map-skills-elementary-students/>
- National Geographic Society: Map Skills for Elementary Students Lesson Plans:
https://media.nationalgeographic.org/assets/file/preK_6_MapActivitiesSummary.pdf
- National Geographic Kids Mapmaker Interactive: An online tool that allows students to create their own maps while learning about different map elements.
<https://mapmaker.nationalgeographic.org>
- Google Earth
- Alutiiq Word of the Week Archive: Map — *Nunam Kalikaa*
<https://alutiiqmuseum.org/collection/Detail/word/336>

Map Legend Detectives



Buskin Area Trails *Kodiak Refuge Reference Guide*



Remember: You are in Kodiak brown bear country!

It is very common for bears to use the trails throughout Kodiak Island. In the summer and fall seasons, when salmon are migrating upstream and berries are abundant, bears are busy eating to store fat in preparation for winter.

The best prevention is to not surprise a bear

Practice Bear Safety:

- Stay alert
- Make noise
- Travel in groups
- Carry and know how to use bear spray



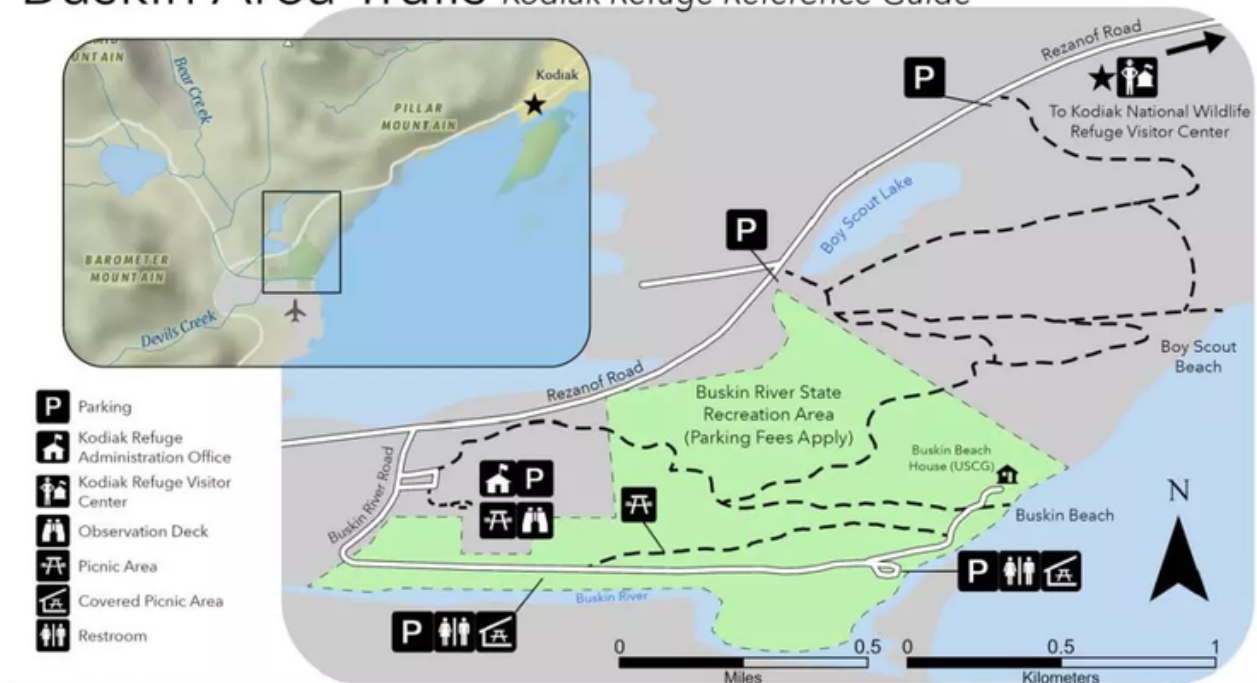
<https://www.fws.gov/refuge/kodiak/visit-us/locations/refuge-headquarters>

What do the symbols represent?

Map Legend Detectives



Buskin Area Trails Kodiak Refuge Reference Guide



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What do the symbols represent?

- P** Parking
- House icon: Kodiak Refuge Administration Office
- Person icon: Kodiak Refuge Visitor Center
- Binoculars icon: Observation Deck
- Table icon: Picnic Area
- Table with roof icon: Covered Picnic Area
- Person with trash can icon: Restroom

NORTH

Wadasaaq



EAST

Ungalaq



SOUTH

Waaakeq



WEST

Llaaniq



Pacing and Measuring Objects in the classroom

Names of group members _____



Pick two objects in the classroom to measure the distance between. If it is a larger object, be specific about the location of the object. For example, the bottom right corner of the dry-erase board. That way, if someone tried to replicate your measurements, they would be able to get the same numbers. Start by having one group member hold the tape measure at the first object while another group member carefully stretches it to the second object. Record the distance in centimeters. Then pace (walk the line where the tape measure was/is and record how many steps it took to get from the first object to the second one.

1. Object One _____ Object Two _____

Distance in cm _____ Distance in steps _____

2. Object One _____ Object Two _____

Distance in cm _____ Distance in steps _____

3. Object One _____ Object Two _____

Distance in cm _____ Distance in steps _____

Playground Mapping Instructions



1. Pace out the length and width of your assigned area and then transfer those measurements to the graph paper, drawing the boundaries of the area to scale.
 2. Accurately represent the playground's features, including play structures, benches, trees, and pathways using symbols for these features and labeling each one.
 3. Indicate the orientation of your assigned area using cardinal directions to provide a sense of direction on the map.
 4. Create a legend for your map.
 5. Return to class and combine your maps with the rest of the class to create a map of the entire playground.
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Archaeology Education Box

FIFTH GRADE LESSON





Day One

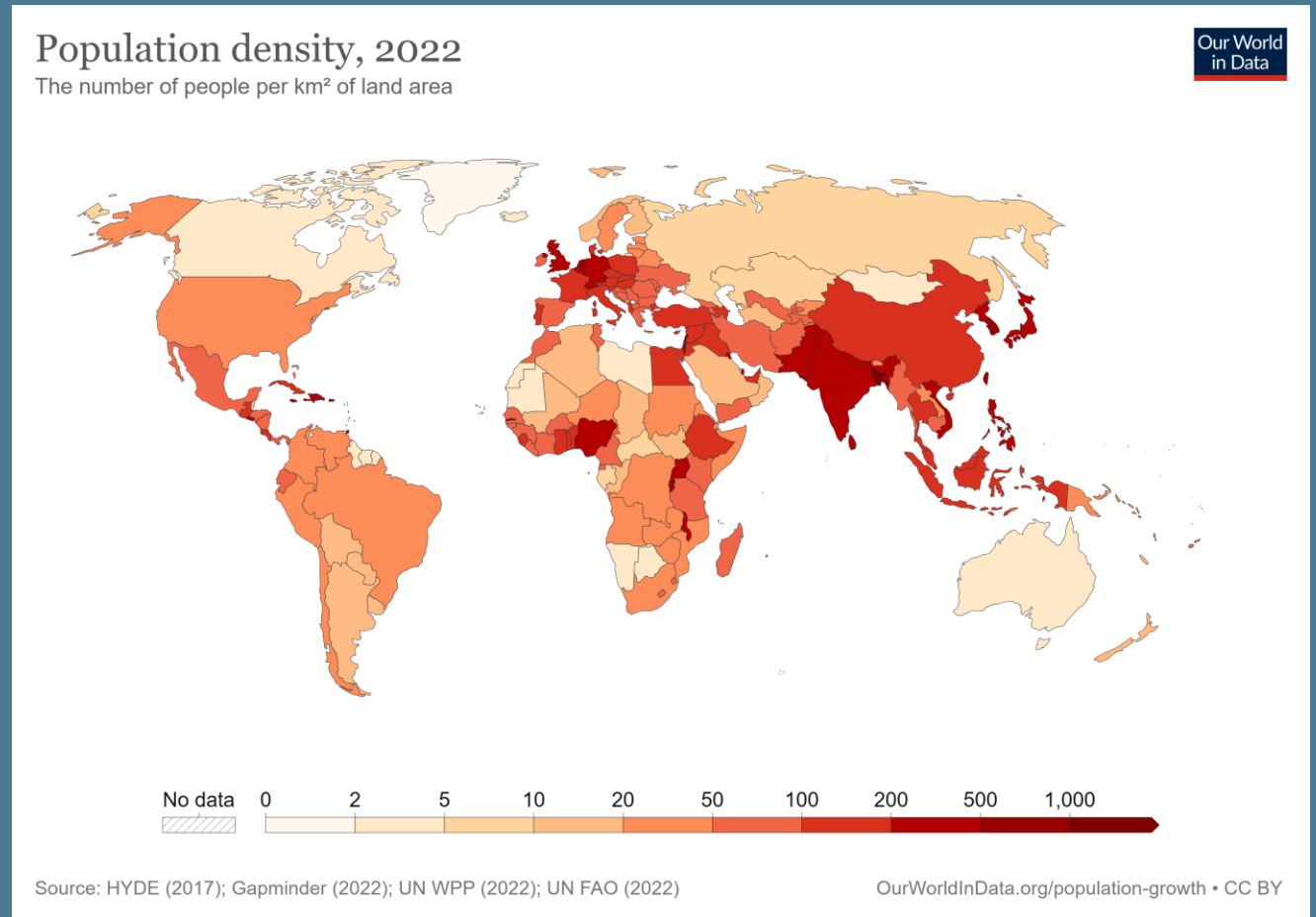
Turn & Talk



How are maps used in the world today?

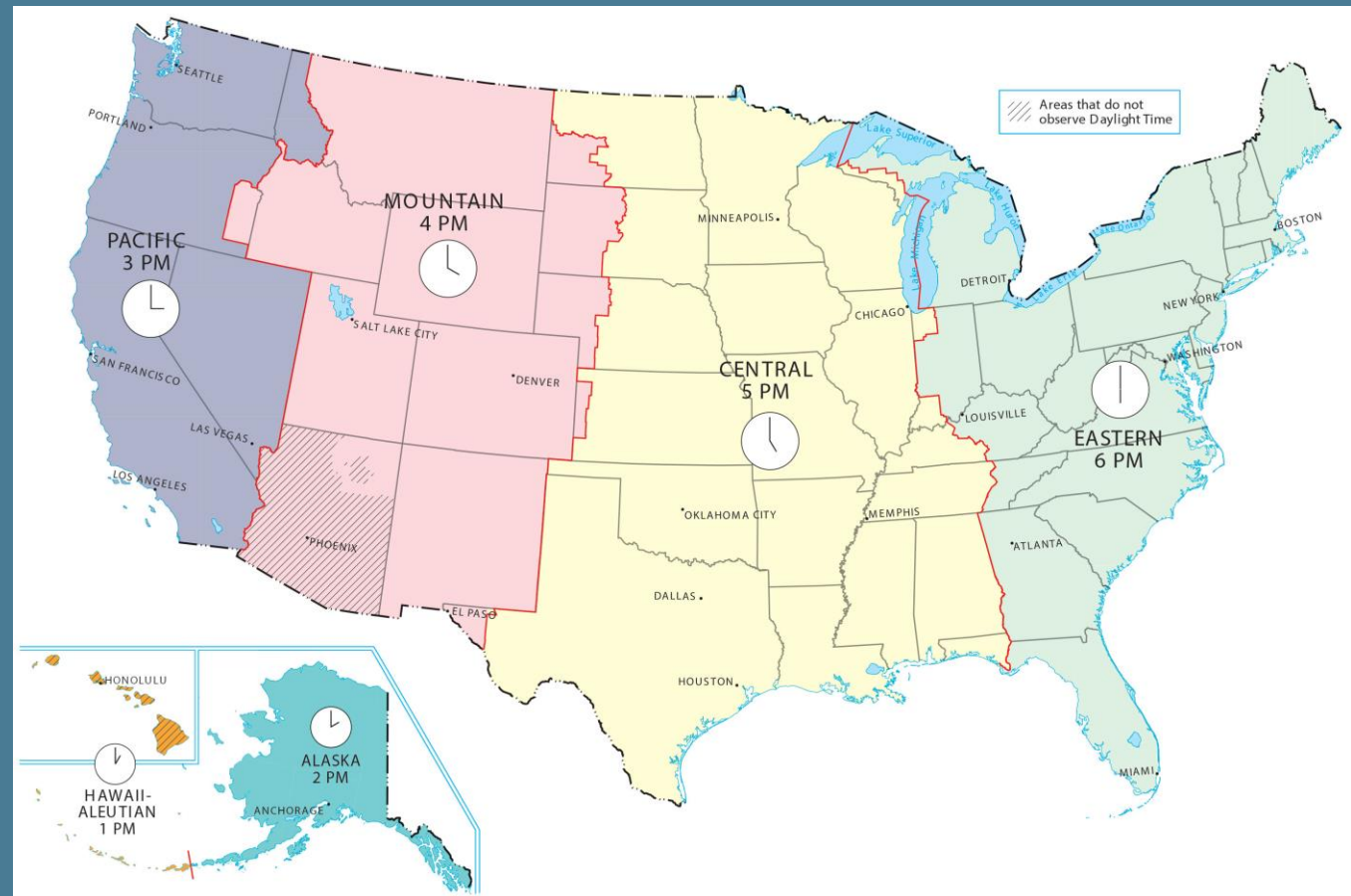
Current uses of maps

- **Navigation**
- **Spatial understanding** – the relationships between different locations and features.
- **Planning and decision-making** – from construction projects to emergency evacuation routes
- **Teach geography and history**
- **Assist travelers** in exploring new locations
- **Data visualization** – to help display data spatially such as population distribution and weather patterns
- **Provide insights** on historical boundaries and routes
- **Help scientists and researchers study** climate patterns, ecosystems, and geological formations.



In summary...

- Maps help us understand the world, make informed decisions, and communicate effectively about locations and spatial relationships.
- They play a significant role in aspects of our lives, from daily navigation to complex scientific research.
- In Alaska specifically, maps are essential for navigating the vast and varied landscape including forests, mountains, and bodies of water.

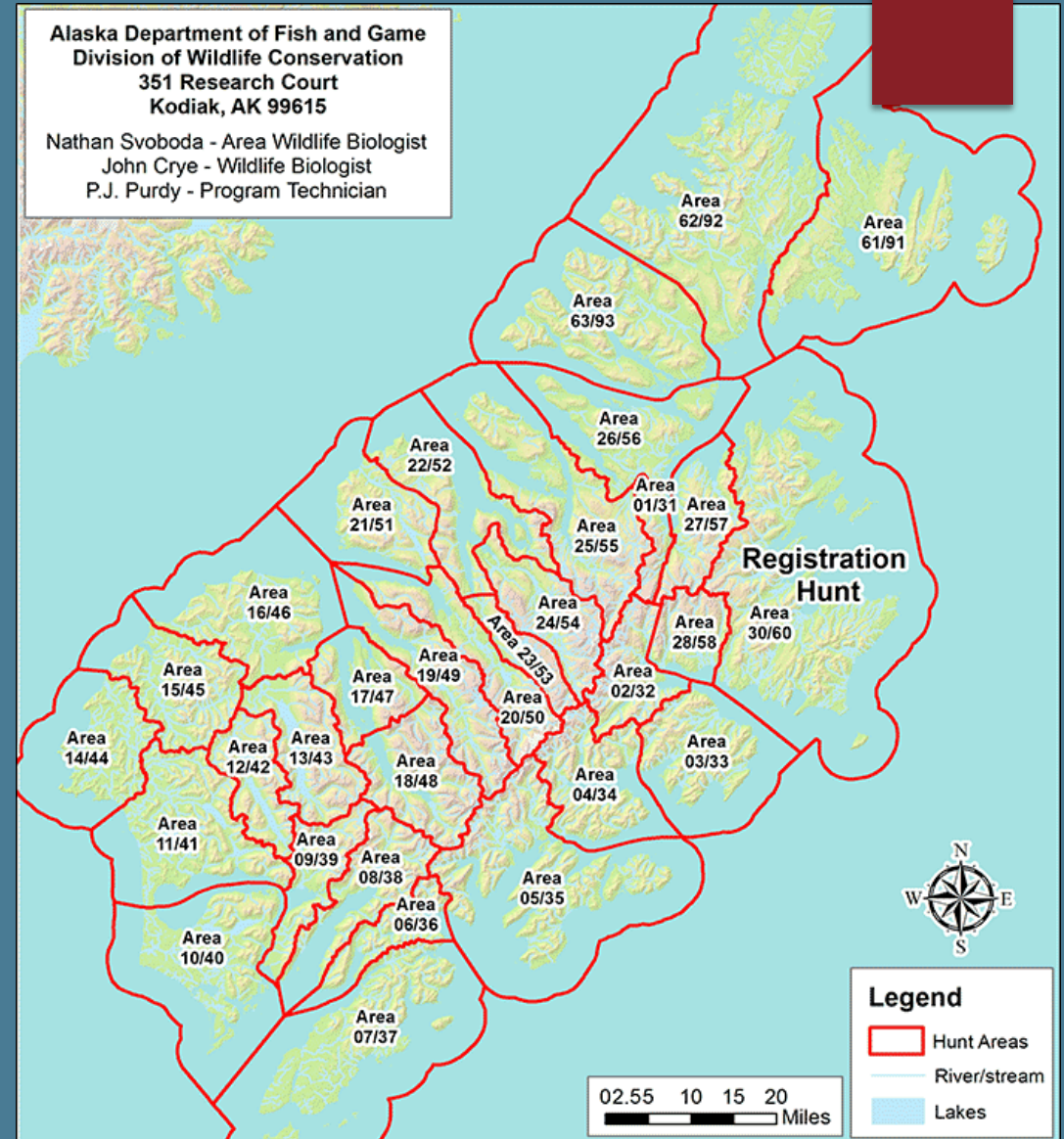




As a class, brainstorm the different types of maps.

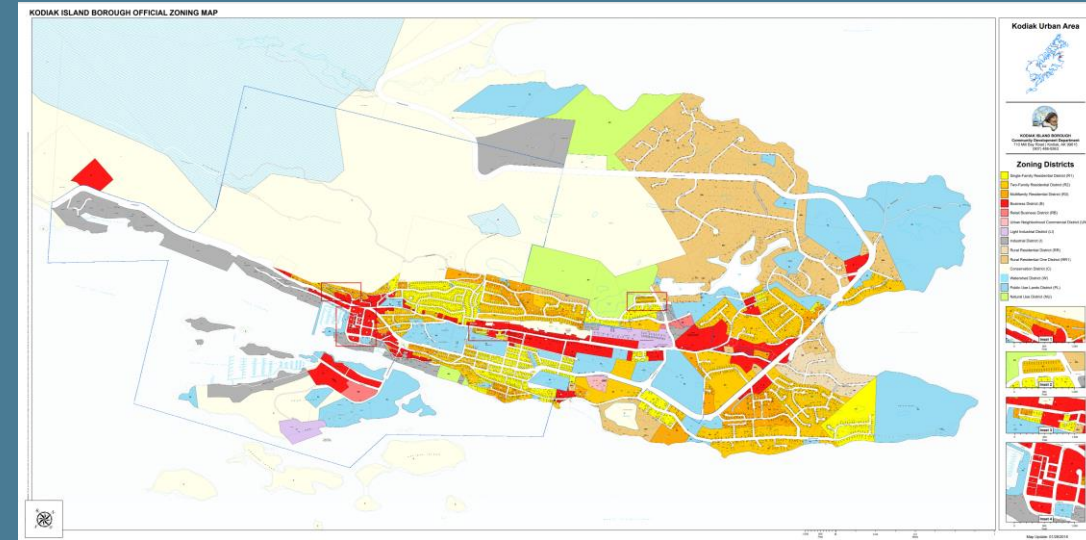
Common maps

- **Political Map:** Shows boundaries of countries, states, and cities, often with political features like capitals and major cities labeled. These maps focus on the administrative divisions of regions.
- **Physical Map:** Depicts natural features of the Earth's surface, such as mountains, rivers, oceans, and deserts. Physical maps use colors and shading to highlight elevation changes and landforms.
- **Topographic Map:** A detailed physical map that includes contour lines to represent changes in elevation. Topographic maps are often used by hikers and surveyors to navigate through terrain.
- **Thematic Map:** Focuses on a specific theme or topic, such as population density, climate, economic activities, or transportation networks. Thematic maps use various symbols and colors to represent data.
- **Climate Map:** Shows climate zones and patterns across different regions. These maps use colors to represent different climatic conditions like temperature and precipitation.
- **Population Density Map:** Illustrates the concentration of people in different areas, usually using colors to indicate levels of population density.
- **Road Map:** Designed for navigation, road maps show highways, roads, and streets. They often include information about distances between locations and points of interest.

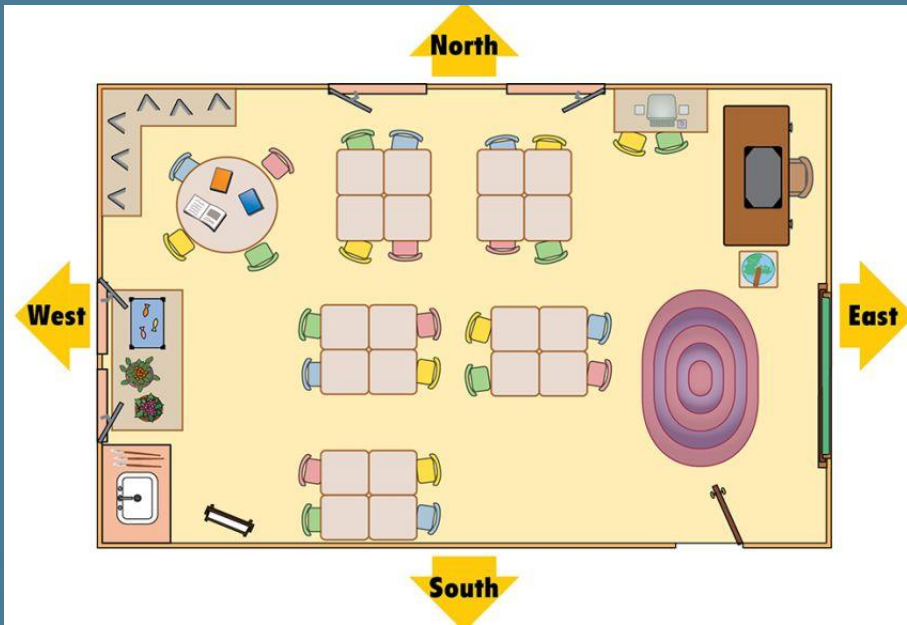


Common maps continued...

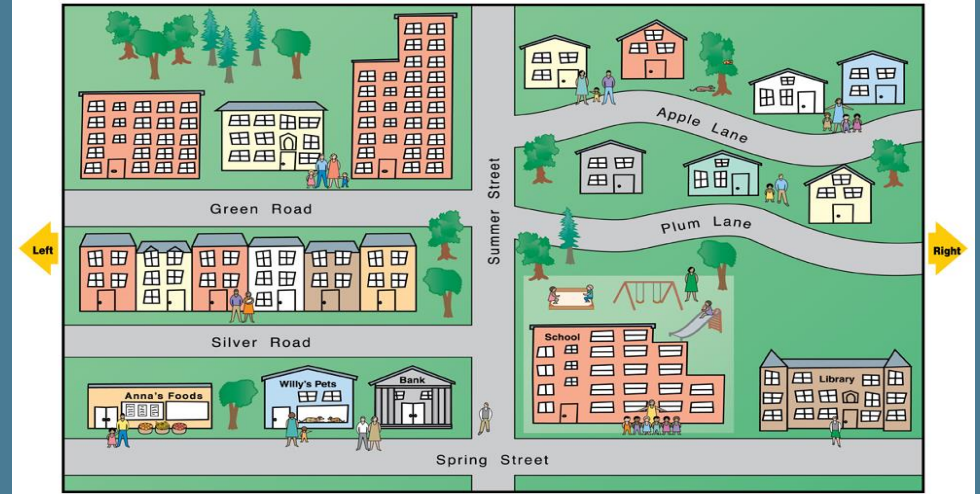
- **Satellite Image Map:** Utilizes satellite imagery to display the Earth's surface from space. These maps provide a realistic view of landscapes and features.
- **Historical Map:** Depicts a specific historical period, showing political boundaries, territories, and cities as they existed in the past.
- **Cadastral Map:** Focuses on land ownership and property boundaries. These maps are often used for property assessment and land management.
- **Aerial Map:** Similar to satellite image maps, aerial maps use photographs taken from aircrafts to show detailed views of landscapes and urban areas.
- **Nautical Chart:** Created for maritime navigation, nautical charts display bodies of water, coastlines, depths, and underwater hazards.
- **Geological Map:** Illustrates the distribution of rock formations, minerals, and geological features in a specific area.
- **Zoning Map:** Used by urban planners and local governments, zoning maps show land-use regulations and zones within a city or municipality.



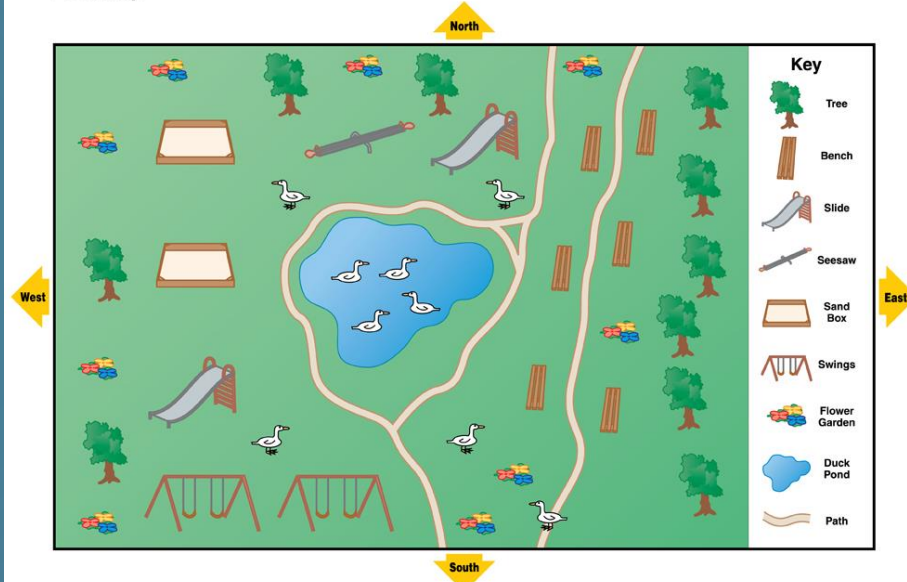
Maps



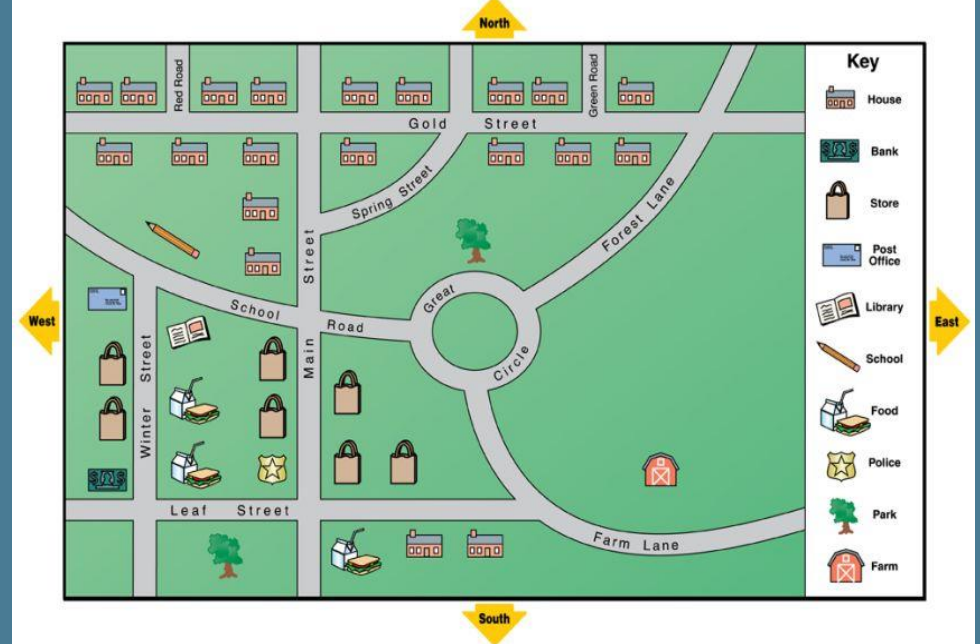
Neighborhood Map

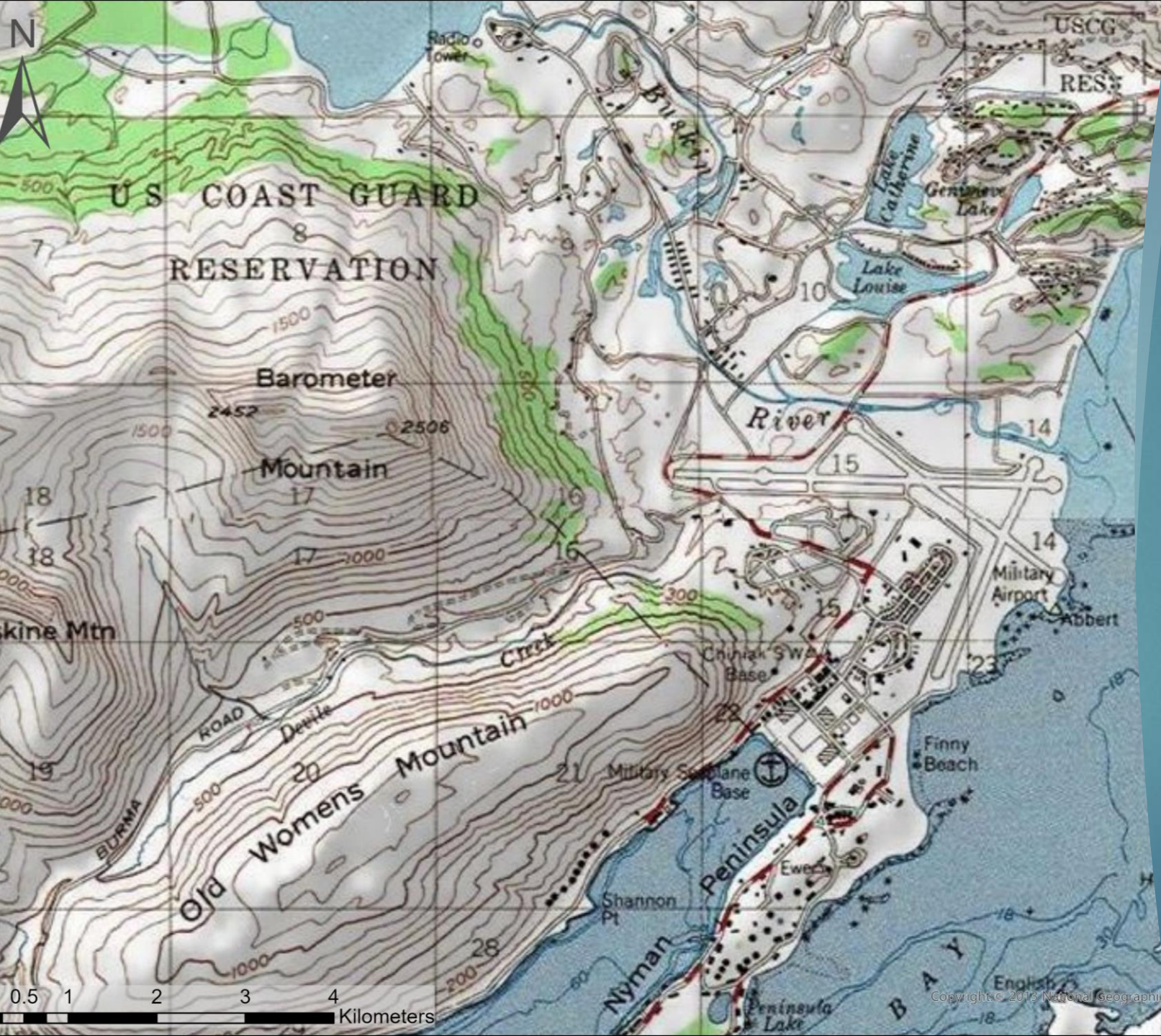


Park Map



Community Map





Topographic map of the U.S. Coast Guard base and Kodiak Airport

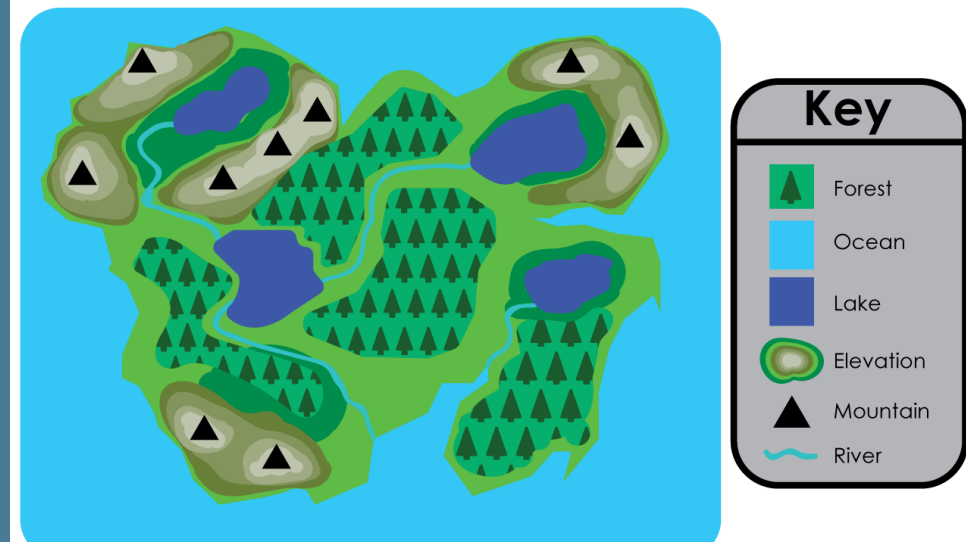
Turn & Talk



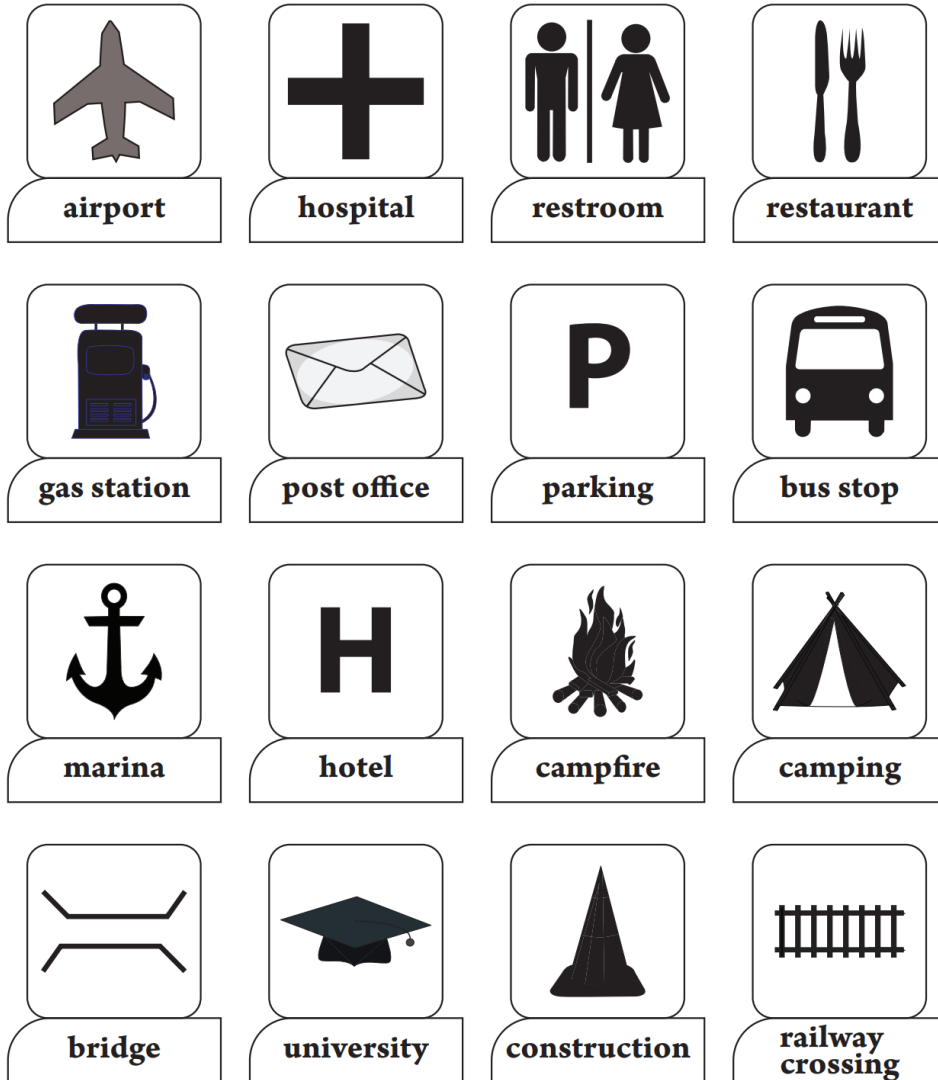
Why is it important to have symbols and legends on maps?

Symbols & Legends

- Symbols allow maps to show a lot of information about features like roads, buildings, and rivers in a visually concise manner
- They save space
- Allow for quick interpretation
- Some are universally understood
- Legends are keys that explain the meanings of the symbols used on a map.



Map Symbols



Write down as many commonly used map symbols you can think of with your partner.

Exit Ticket

List three things you learned about maps today.

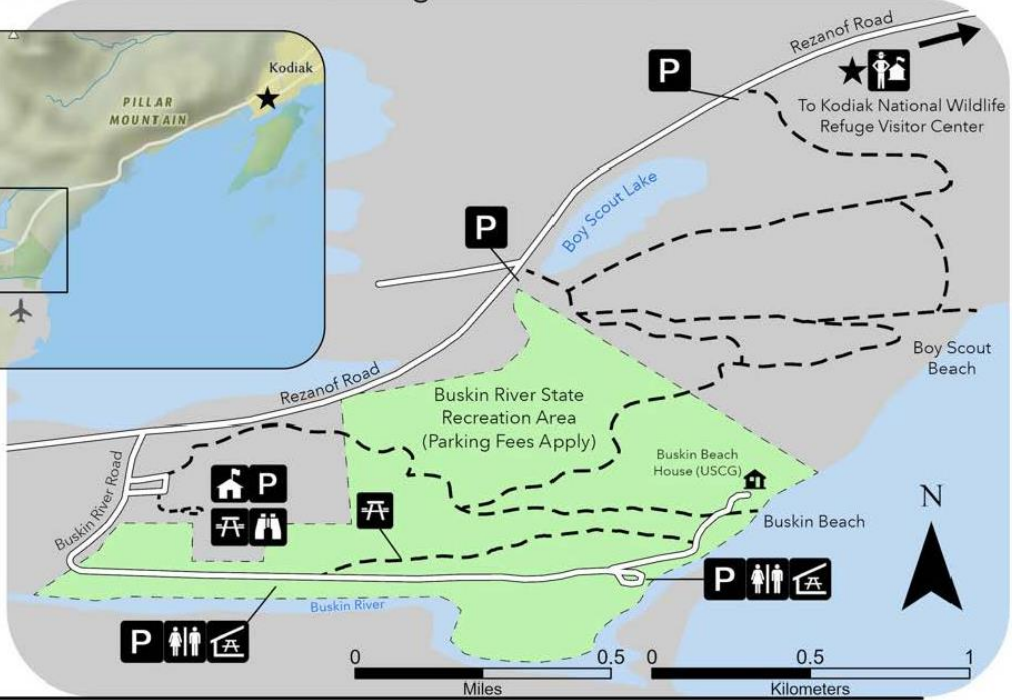
What is one thing about maps that you are curious about after today?

Day Two

Map Legend Detectives' Activity



Buskin Area Trails *Kodiak Refuge Reference Guide*



Check
your
answers



Remember: You are in Kodiak brown bear country!
It is very common for bears to use the trails throughout Kodiak Island. In the summer and fall seasons, when salmon are migrating upstream and berries are abundant, bears are busy eating to store fat in preparation for winter.



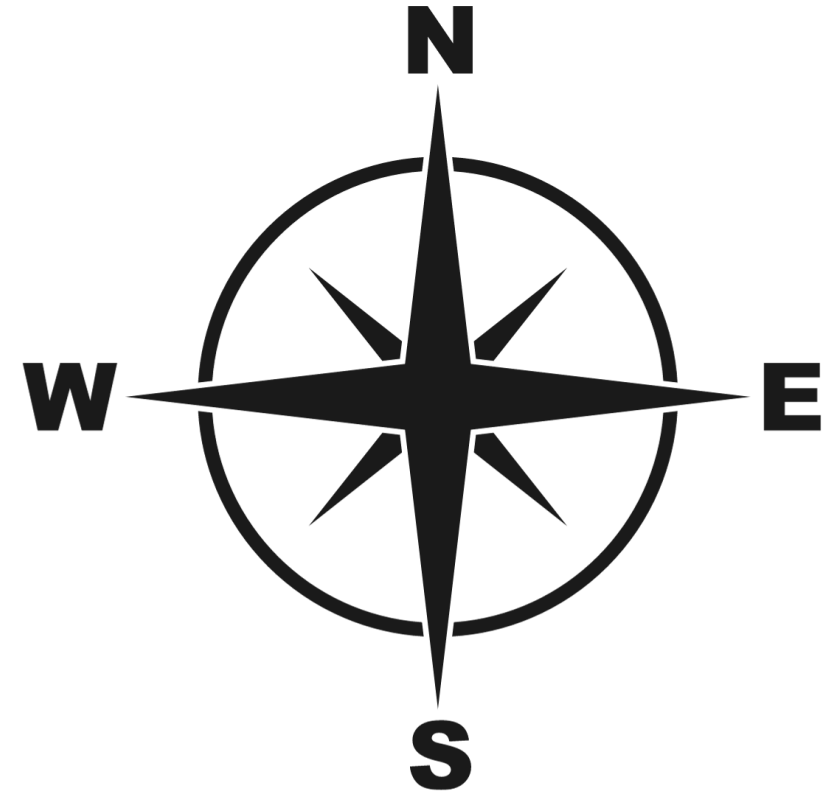
Practice Bear Safety:

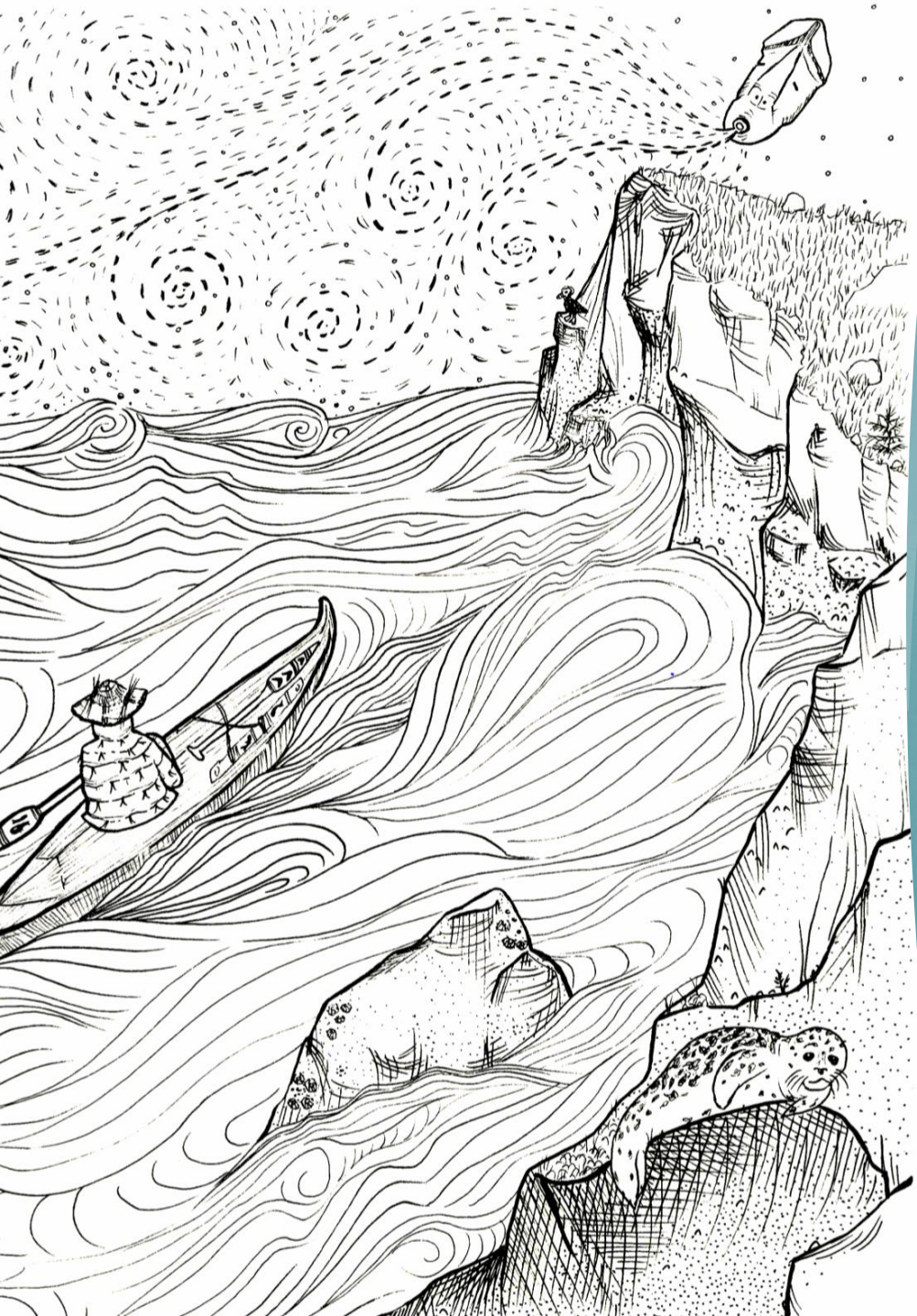
- Stay alert
- Make noise
- Travel in groups
- Carry and know how to use bear spray

The best prevention is to not surprise a bear

Cardinal directions and coordinates

- **North:** The top of most maps is oriented toward the north direction. North is represented by the letter “N” or an upward-pointing arrow.
- **South:** The bottom of the map is oriented toward the south direction. South is represented by the letter “S” or a downward-pointing arrow.
- **East:** The right side of the map is oriented toward the east direction. East is represented by the letter “E” or a right-pointing arrow.
- **West:** The left side of the map is oriented toward the west direction. West is represented by the letter “W” or a left-pointing arrow.
- **Latitude:** Explain that lines of latitude run east-west around the earth and measure distances north and south of the Equator.
- **Longitude:** Explain that lines of longitude run north-south from pole to pole and measure distances east and west of the Prime Meridian.
- *Directions help us understand the relative positions of different features on a map. They are essential for reading maps accurately and navigating to specific locations.*





Different ways to find directions

Before modern compasses, people used other methods to find their way, and many people still do today when not using a GPS or compass.

- Other ways to find directions:
- The location of the sun.
- The location of the stars.
- The location of landmarks.
- The direction of the wind.
- The location of a shadow using a stick.

NORTH



Waasaq

Listen to Dehrich Chya
pronounce the Alutiiq Word

Please note — some speakers may use these Alutiiq terms to refer to slightly different directions. For example, *Waasaq* may mean "north" for some speakers, but "northwest" to others.

WEST

Llaaniq



Listen to Dehrich Chya
pronounce the Alutiiq Word

SOUTH

Waaakeq



Listen to Dehrich
Chya pronounce
the Alutiiq Word

EAST



Listen to Dehrich Chya
pronounce the Alutiiq
Word

Ungalaq

Map Scales

Map scales help us understand the relationship between map distances and real-world distances, allowing us to interpret the size and distance of features accurately. There are three types of scales.

- **Ratio scale:** This is expressed as a ratio. For example, in a 1:10,000 scale, 1 inch on the map represents 10,000 inches on the ground
- **Graphic scale:** A line or a bar marked with different lengths that represent specific distances. It is typically labeled with both map units (inches or centimeters) and real-world units (miles or kilometers).
- **Verbal Scale:** Uses words to describe the relationship between map distances and ground distances. For example, it might say “1 inch represents 1 mile.”



How do you find an archaeological site?

- Look at old maps
- Read historical accounts and stories
- Talk to Elders and community members that know the landscape
- Look at aerial photos and LiDAR imagery to find collapsed structures or other human-made features
- Survey – look for artifacts, collapsed structures, or fire cracked rock
- Dig small test pits to look for artifacts or other cultural materials

Video: How Do Archaeologists Know Where to Dig?



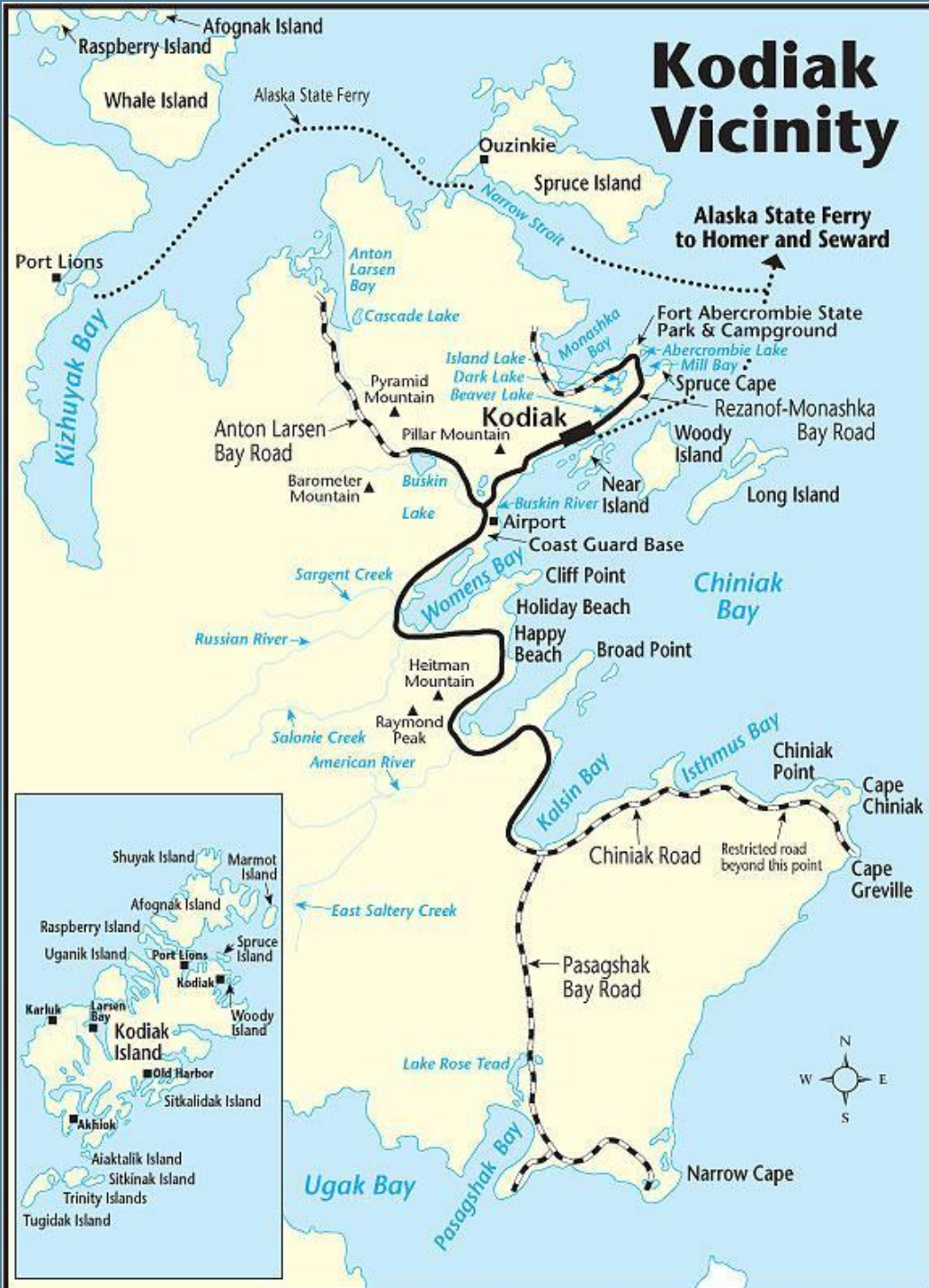
Courtesy of History Nebraska



Where are you on a world map?

Where
are you
on the
map of
Alaska?





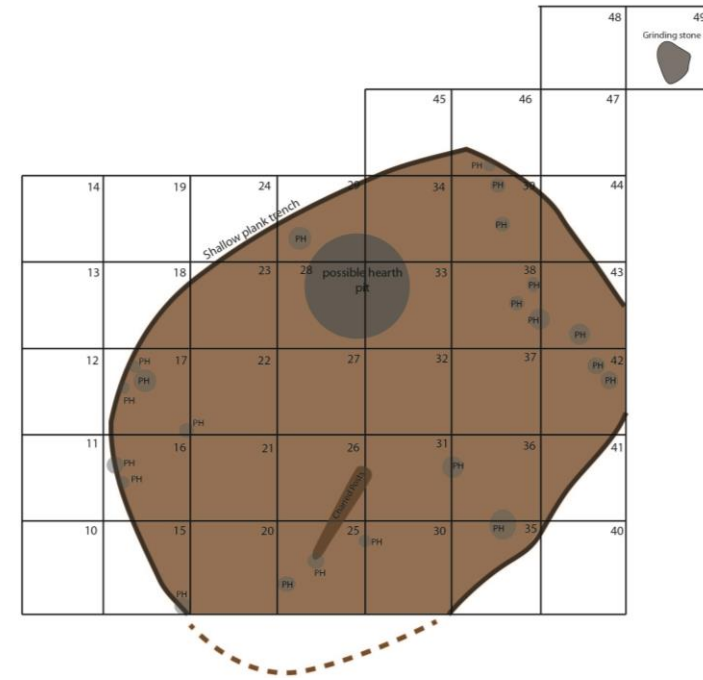
Where are you
on a map of
Kodiak?

Turn & Talk



Why do archaeologists need mapping skills?

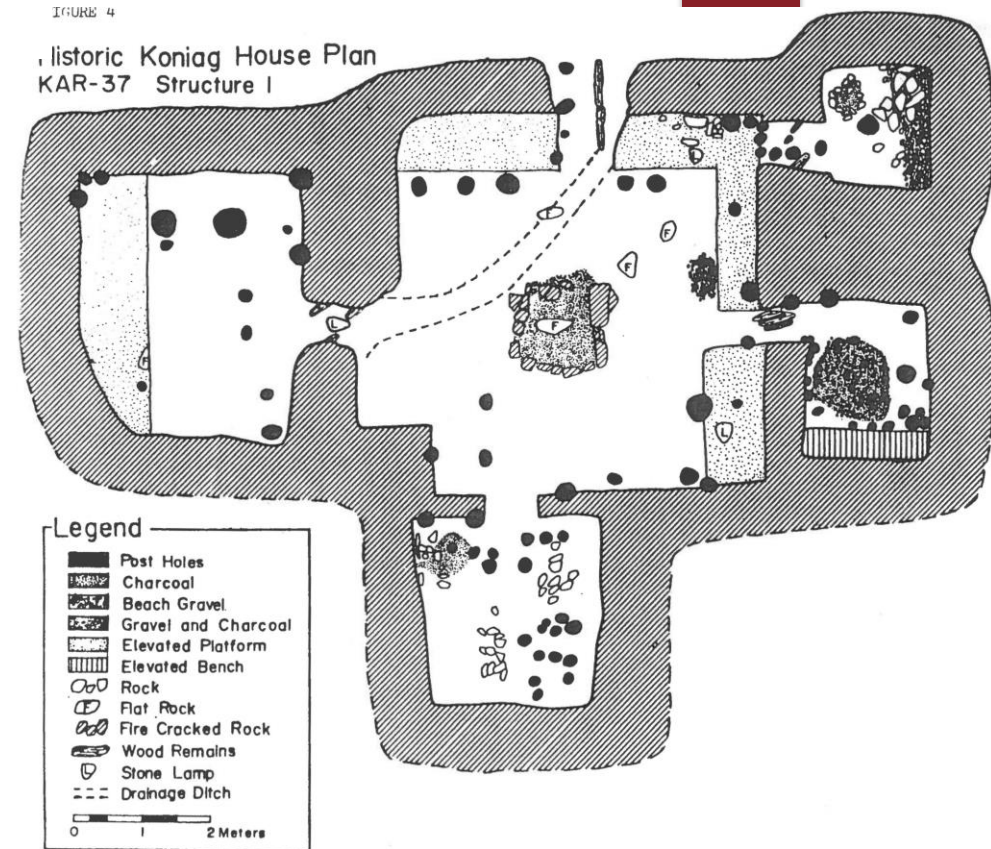
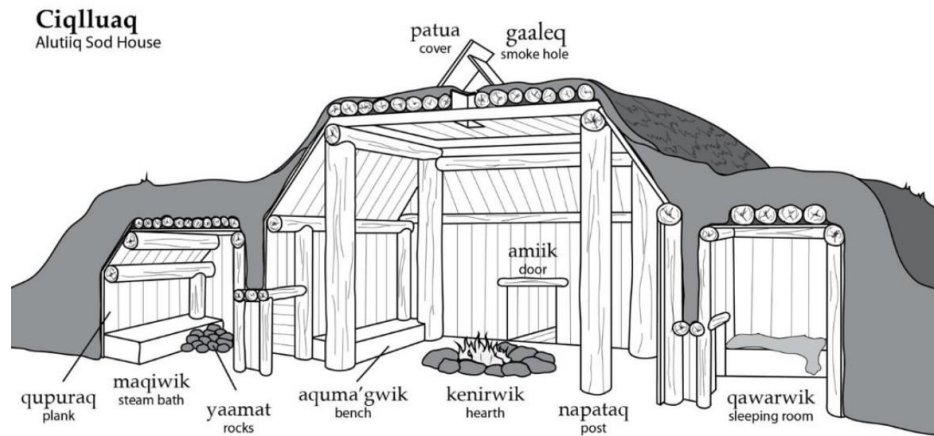
- **Site Documentation:** Maps allow archaeologists to document the layout of excavation sites, artifact distributions, and the positions of features. This documentation is essential for accurately recording the context of artifacts and structures within a site.
- **Understanding:** Maps help archaeologists understand the relationships between different artifacts, features, and structures. This information helps to show how people lived, worked, and interacted within a specific area.
- **Planning and Strategy:** Archaeologists use maps to plan excavation strategies. They can determine where to place excavation units based on the distribution of artifacts and features.
- **Recording Progress:** Maps help archaeologists track the progress of their excavation by showing which areas have been excavated and which remain untouched.
- **Comparison:** Archaeologists often compare maps from different excavation seasons or sites to analyze changes in the landscape or settlement patterns over time.



- **Spatial Patterns:** Maps reveal spatial patterns, such as concentrations of artifacts or evidence of human activity, which may provide insights into cultural practices like trade routes and village organization.
- **Communication:** Maps facilitate communication among archaeologists and other experts. They provide a visual representation of findings, making it easier to convey information to other people.
- **Research and Interpretation:** By analyzing maps, archaeologists can generate ideas about how people used and interacted with their environment.
- **Preservation:** Accurate mapping helps archaeologists plan for the preservation of sites, ensuring that future research can continue to uncover new information.
- **Publication:** Archaeologists often publish maps as part of their research reports, helping others to understand their finds.



Maps help archaeologists understand and record the remains of buildings like this sod house.



The map on the right shows a sod house built about 1840. Archaeologists uncovered the house and made this map. Then, an artist used the map to draw a picture of what the house might have looked like shown on the left.

Exit Ticket

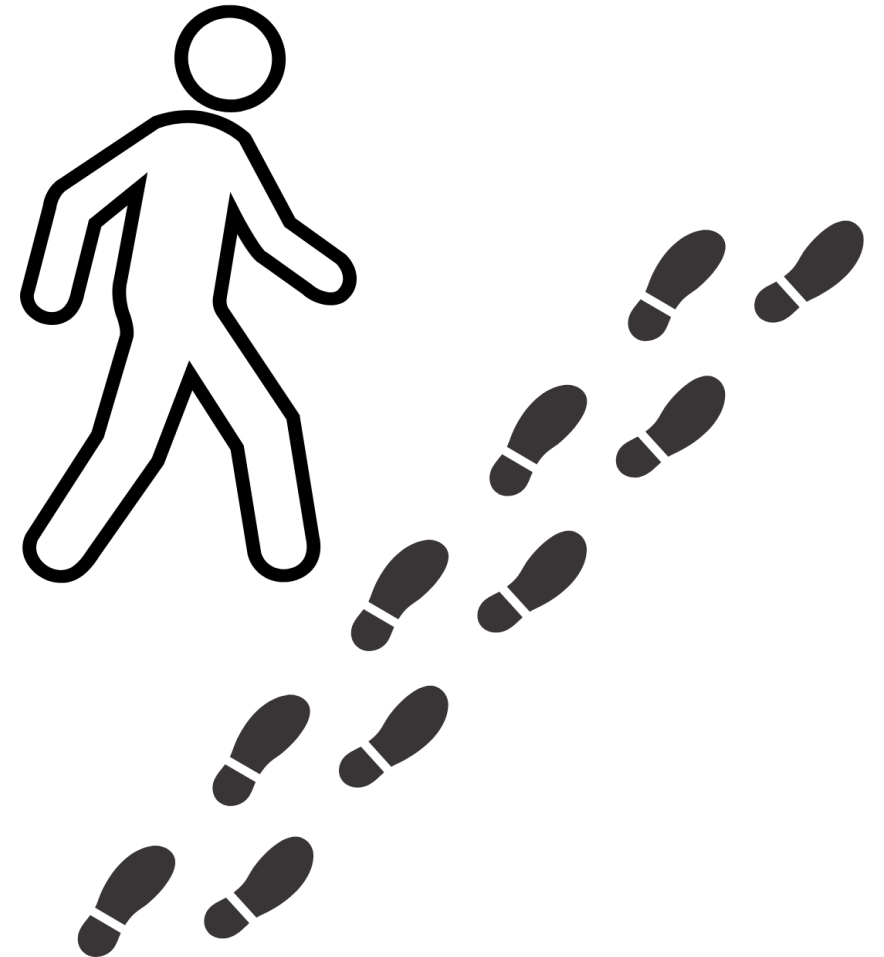
List three reasons why archaeologists need mapping skills.

What is one thing that you are curious about archaeology after today?



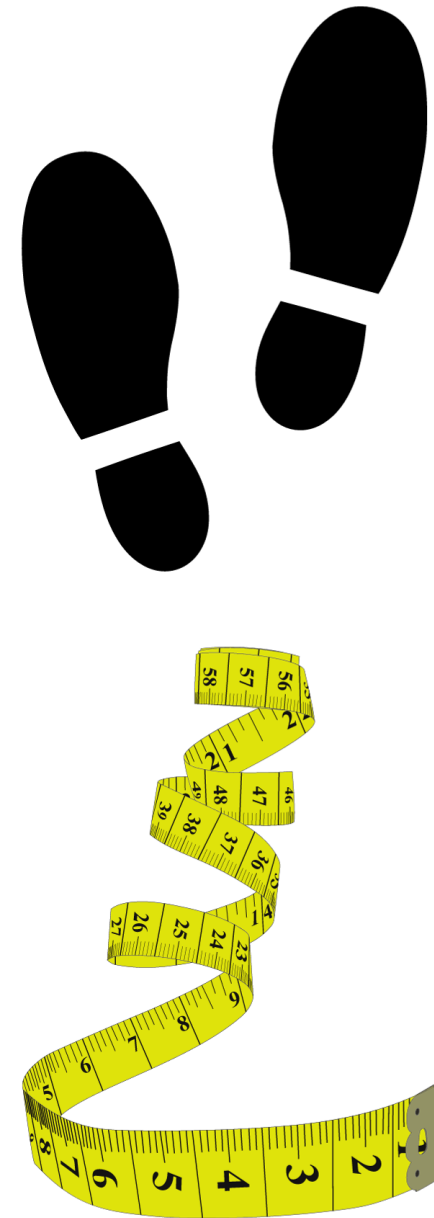
Day Three

Pacing Demonstration



Pacing and measuring objects in the classroom activity

1. Pick two objects in the classroom to measure the distances between. If it is a larger object, be more specific. For example, the bottom right corner of the dry erase board. If someone tried to replicate what you are doing, would they be able to do so?
2. Start by having one student hold the tape measure/measuring tape at the first object while another student carefully stretches it to the second object.
3. Record the distance in centimeters.
4. Then pace or walk the line where the tape measure/measuring tape was and record how many steps it took to get from the first object to the second one.
5. Repeat this process two more times.



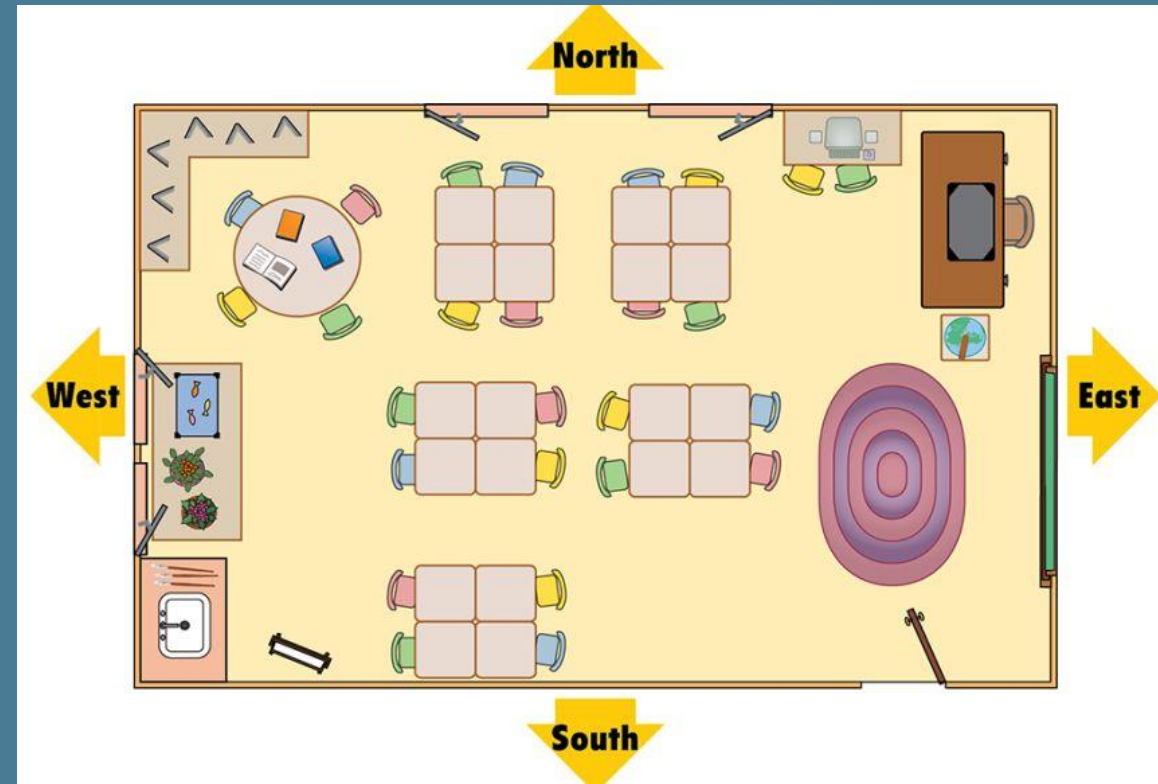
Basic sketching activity instructions

1. Sketch the overall shape of the classroom on your paper drawing walls, doors, and windows as accurately as possible. Using the directions up on the walls, orient your map so that the northern wall is at the top of the paper.
2. Add desks, chairs, and any other major objects in their approximate positions. Use symbols for simple/smaller objects like chairs (small squares) and windows (small rectangles) and provide a legend so that a map reader will know what the symbols represent.
3. Label the key features on your map. For example, teacher's desk, door, drinking fountain.

Instructions for making a scaled sketch of the classroom

1. Pick a starting point (one of the corners of the north wall). Measure the dimensions of the classroom, including the length, width, and key features like doors and windows.
2. Use the scale to calculate how long each wall and feature will be on your map. For example, if the classroom is 30 feet long and you are using a 1 inch=1 foot scale, the length of the map will be 30 inches.
3. On graph paper, use your ruler to draw the northern wall to scale along the top. Continue to draw the remaining walls/layout of the classroom according to their scale measurements.
4. Add desks, chairs, windows, and doors to the map in the correct positions, as if you were looking at the classroom from a bird's eye view.
5. Create a legend with symbols for desks, chairs, windows, doors, etc. and write down what each symbol represents.
6. Label key features on the map such as the teacher's desk, drinking fountain, windows, doors, etc.

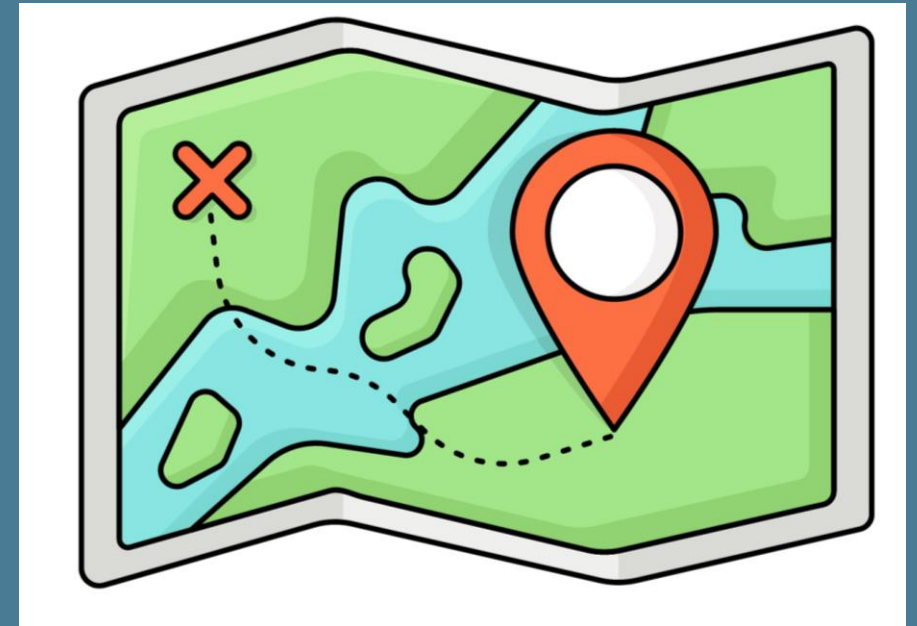
Class Discussion



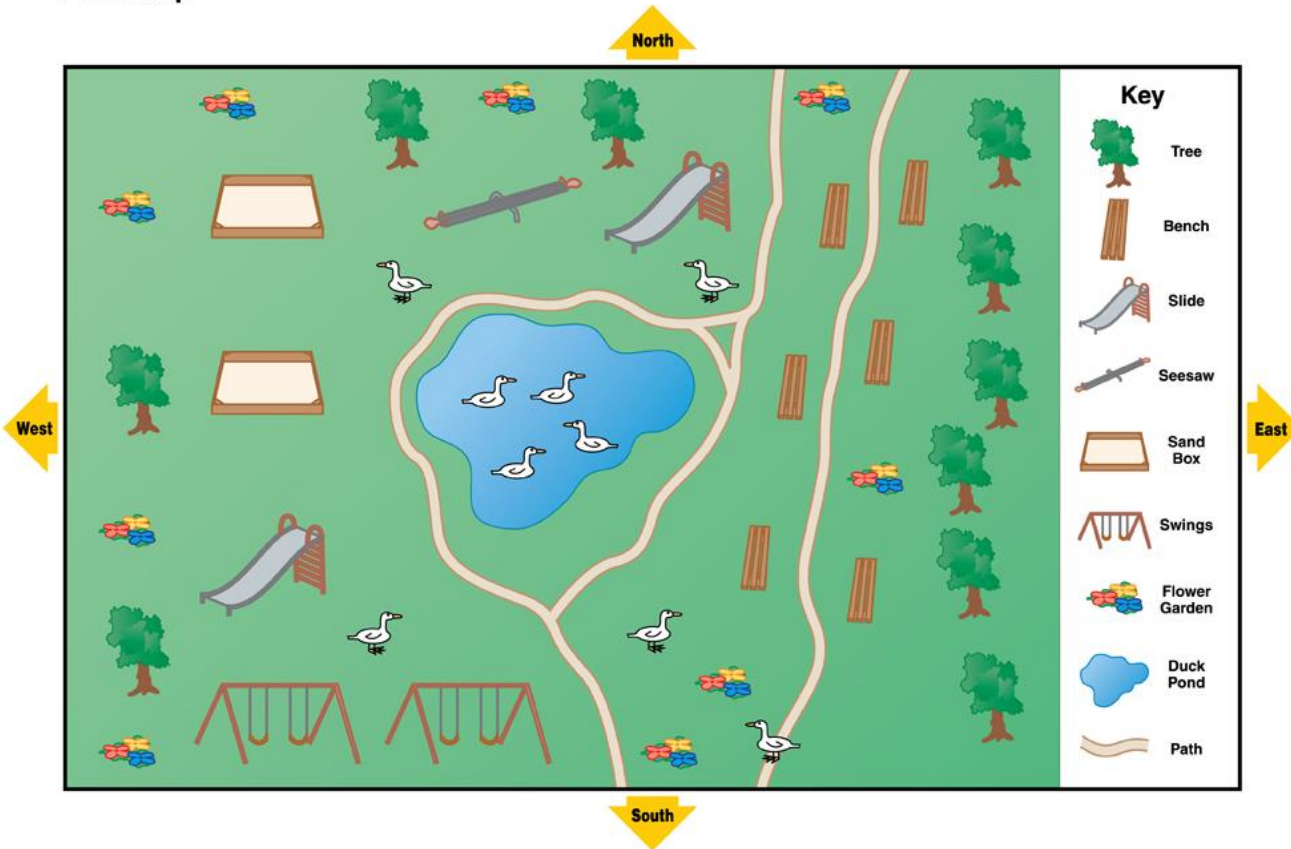
Day Four

Playground mapping instructions

1. Pace out the length and width of your assigned area and then transfer those measurements to the graph paper, drawing the boundaries of the area to scale.
2. Accurately represent the playground's features, including play structures, benches, trees, and pathways using symbols for these features and labeling each one.
3. Indicate the orientation of your assigned area using cardinal directions to provide a sense of direction on the map.
4. Create a legend for your map.
5. Return to class and combine your maps with the rest of the class to create a map of the entire playground.



Park Map



Class Discussion

Day Five

What to do if you find a site

- Where is the site located? Put a dot on a map. Mark the GPS coordinates. This will help people find it again.
- What type of site is it? What do you see? Include as much detail as possible.
- Make a sketch map of the site. Note things like water, bank edges, trees, hills, trails, and anything else you see. This will help identify different things at the location.
- Be sure to never dig in a site. Take photographs and notes. Report your finds to the landowner or an archaeologist at the Alutiiq Museum.
- Teach your family and friends to respect archaeological sites. Most people do not know that it is destructive, disrespectful, and illegal to alter sites.
- Report site vandalism to the Alaska Office of History and Archaeology.



Additional Videos:

- An Archaeological Survey of Sitkinak Island, Alaska by archaeologist Patrick Saltonstall
<https://vimeo.com/695860623>

- This Sod House
https://www.youtube.com/watch?v=6oM9M8B_s8k



Image Credits:

- Slide 4: Our World in Data <https://ourworldindata.org/grapher/population-density>
- Slide 5: GISGeography <https://gisgeography.com/us-time-zone-map/>
- Slide 6: Large topography map of Alaska state | Alaska state | USA | Maps of the ... (Mable Webster) <https://topographicmapofusawithstates.github.io/new-752-map-of-usa-and-alaska-photos/>
- Slide 7: The Great State of Alaska <https://www.adfg.alaska.gov/index.cfm?adfg=kodiakbear.main>
- Slide 8: Photo: Kodiak Island Borough Official Zoning Map <https://www.kodiakak.us/DocumentCenter/View/9605/Kodiak-Urban-Area-Zoning-Map-36-x-72>
- Slide 9: MAP COURTESY NATIONAL GEOGRAPHIC LEARNING/CENGAGE LEARNING <https://education.nationalgeographic.org/resource/maps-and-models/>
- Slide 10: USGS topographic map, Seward Meridian, Kodiak D2 quadrangle
- Slide 12: Elinor Wonders Why | PBS LearningMedia <https://alaskapublic.pbslearningmedia.org/collection/elinor/>
- <https://www.pinterest.com/pin/152981718581951885/>
- Slide 13: Photo: Map Symbols <https://www.tutoringhour.com/files/map-skills/symbols-chart.pdf>
- Slide 17: U.S. Fish & Wildlife Service <https://www.fws.gov/refuge/kodiak/visit-us/locations/refuge-headquarters>
- Slide 27: VECTORWORLDMAP www.vectorworldmap.com
- Slide 28: Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Esri, USGS
- Slide 29: www.alaskamagazine.com
- Slide 33: Left, Parts of a ciqlluaq. Illustration by Alisha Drabek for the Alutiiq Museum. Right, map of a sod house excavated at KAR-00037 from Jordan and Knecht 1985, Nunakakhnak: An Historic Period Koniag Village in Karluk, Kodiak Alaska, Alaska. *Arctic Anthropology* 22(2):17-35.
- Slide 40: MAP COURTESY NATIONAL GEOGRAPHIC LEARNING/CENGAGE LEARNING <https://education.nationalgeographic.org/resource/classroom-map/>
- Slide 43: MAP COURTESY NATIONAL GEOGRAPHIC LEARNING/CENGAGE LEARNING <https://education.nationalgeographic.org/resource/maps-and-models/>